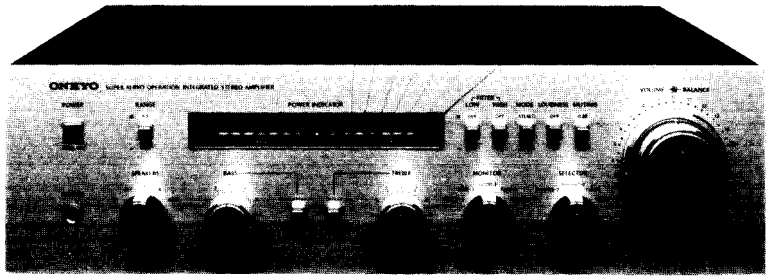
SERIAL NO. 3057

ONKYO® SERVICE MANUAL

SUPER SERVO OPERATION
INTEGRATED STEREO AMPLIFIER
MODEL A-7070



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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

Power Output:	70 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.02% total harmonic distortion.
Total Harmonic Distortion:	0.02% at rated power 0.018% at 1 watt output
IM Distortion: (60 Hz: 7 kHz = 4:1)	0.02% at rated power 0.018% at 1 watt output
Frequency Response:	15 ~ 50,000 Hz (±1 dB)
RIAA Deviation:	20 ~ 20,000 Hz (±0.3 dB)
Damping Factor:	50 at 8 ohms
Input Sensitivity and Impedance:	PHONE 1 & 2: 2.5mV, 50 kohms TUNER: 150mV, 50 kohms AUX: 150mV, 50 kohms TAPE PLAY 1 & 2: 150mV, 50 kohms
Phono Overload:	200 mV RMS. at 1 kHz, 0.02% THD
Tone Control	
BASS:	±10 dB at 100 Hz (turn over at 400 Hz)
TREBLE:	±10 dB at 10 kHz (turn over at 2 kHz)
Turnover Frequency:	BASS: 400 Hz TREBLE: 2 kHz
Filter LOW:	100 Hz (12 dB/oct.)
HIGH:	6 kHz (12 dB/oct.)
Signal to noise ratio:	PHONO: 80 dB (IHF A Network) AUX: 90 dB (IHF A Network)
Muting:	−20 dB
Loudness:	(−40 dB) +5 dB at 100 Hz +5 dB at 10 kHz
Range:	(Ind. switch) x1 and x0.1
GENERAL	
Power Supply Rating:	AC 120V, 50 Hz (120V model) AC 110, 120, 220/240V, 50, 60Hz
Outputs:	SPEAKER A & B, PHONES, TAPE REC 1 & 2
Inputs:	PHONO 1 & 2 TUNER AUX TAPE PLAY 1 & 2
Semiconductors:	2 FETs, 35 Transistors, 10 ICs, 26 Diodes
Dimensions:	418(W) x 124(H) x 396(D) mm 16-1/2" x 4-15/16" x 15-5/8"
Weight:	10.3 kg (22.7 lbs.)

Specifications and features are subject to change without notice for improvement.

PRECAUTIONS

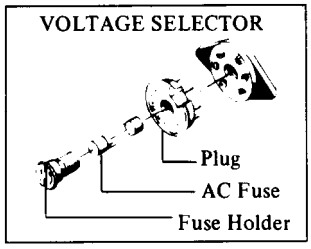
1. For continued protection against fire hazard, replace only with same type and same rating fuse.

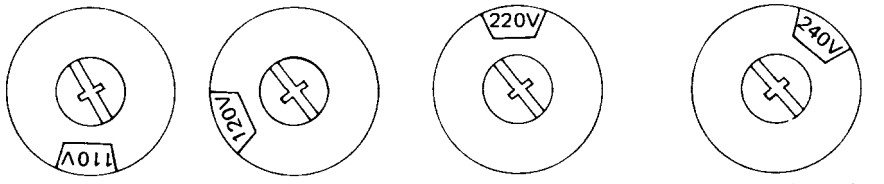
		PARTS NO.
AC fuse	5A (ST-6)	252050 (110/120V model)
	3A-T	252003 (220/240V model)

2. Replacement for power amplifier transistors, if necessary, must be made from the same beta (h_{FE}) group as the original type.
3. Always disconnect the chassis from power line when soldering.
   Turning the power switch OFF is not enough.
   Power line leakage passing through the heating element may destroy the transistors.

VOLTAGE CONVERSION (Universal model)

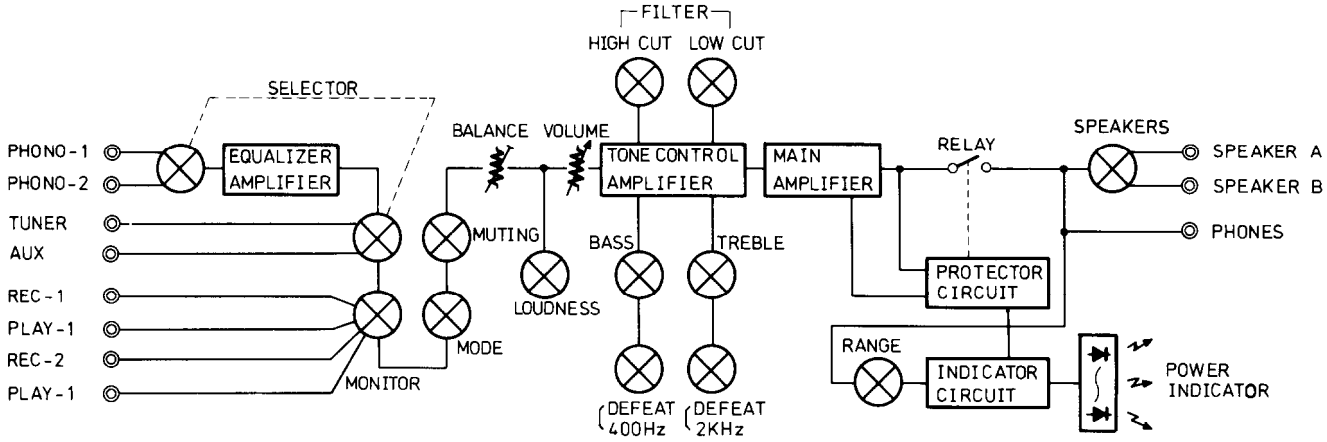
This model is equipped with a universal power transformer to permit operation at either power source of 110, 120, 220 or 240V AC 50/60Hz.
To convert the unit to a different power source voltage, change the plug as illustrated in the drawing below.
CAUTION: DISCONNECT POWER SUPPLY CORD FROM AC OUTLET BEFORE CONVERTING VOLTAGE.





For 110V Operation | For 120V Operation | For 220V Operation | For 240V Operation

BLOCK DIAGRAM



CIRCUIT DESCRIPTION

1. SERVO OPERATIONAL AMPLIFIER

In order to achieve a greater degree of fidelity in waveform transmission, and to remove the large capacitance capacitors (which have questionable effect on the quality of sound) from the NFB, DC amplifier designs are being more and more widely used in amplifiers today. The A-7070, however, has advanced even further by adopting the recently developed Servo Operational Amplifier which features a truly superb quality of sound, and performs considerably better than the now conventional DC amplifiers.

The major circuit feature of the Servo Operational Amplifier (see outline in Fig. 1-1) is the servo feedback loop which has no effect whatsoever on the main signal. In other words, if the signal feedback factor is β_1 and the servo feedback factor β_2, the $0 \fallingdotseq \beta_2 \ll \beta_1 \ll 1$ relation holds true within the signal bandwhdth, while $\beta_2 \gg 1$ holds true in the subsonic region down to DC. For this purpose, a servo feedback amplifier was necessary. And since it was also necessary to include a high-cut filter, and suppress signal amplifier drift at higher DC gain plus 1/f noise and other subsonic region components, a -6dB/oct high-cut mirror integrating circuit (see Fig. 1-2) has been employed. The Vref in Fig. 1-1serves as the input voltage required to keep the system output DC voltage at OV.

In the block diagram for the actual Servo Operational amplifier (see Fig. 1-3), Rf and R_B constitute the signal feedback loop, while A2 and A3 form the servo feedback loop.

Assuming that A1, A2, A3 $\gg$ 1, the input/output characteristics $T(\omega)$ may be expressed as,

$$T(\omega) = \frac{R_N(Rf + R_B)}{A2 \cdot Rf \cdot R_B} \left[\frac{1 + \frac{j\omega}{\omega_1}}{1 + \frac{j\omega}{\omega_2}} \right]$$

where $\omega_0 = \frac{1}{CR}$, $\omega_1 = \frac{\omega_0}{A_2}$, $\omega_2 = \frac{R_F}{R_N}\omega_0$

The frequency response is as shown in Fig. 1.4, ω_2 being about 0.3Hz ~ 2Hz. A3 is phase inverted in order to prevent positive feedback in the DC region.

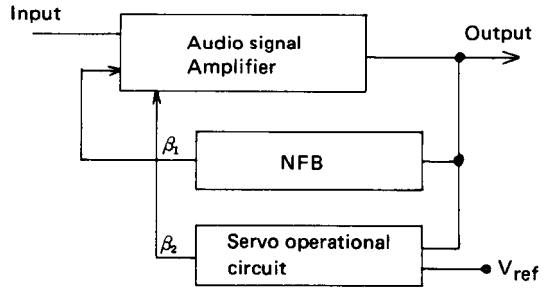


Fig. 1.1

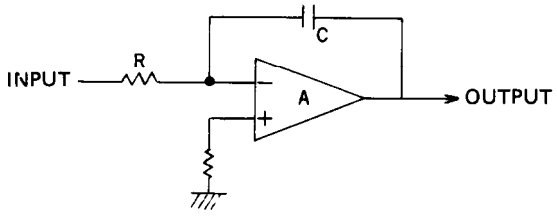


Fig. 1.2

Hence, the subsonic frequencies are effectively cut just as if by coupling capacitor. But unlike capacitors, the output impedance of the servo operational amplifier decreases at lower frequencies (coupling capacitor impedance increases at corresponding frequencies) due to a greater amount of feedback. Since, however, in actual circuits the second stage is driven at a suitable impedance level, and the output impedance of the amplifier itself is made sufficiently large enough (to improve stability) by connecting a resistance γ_o in series, the output impedance is kept constant at γ_o with coupling capacitors, on the other hand, the increased impedance at lower frequencies naturally results in an increase in thermal noise (directly related to effective impedance) in the low frequency region.

Although servo feedback circuit integrating capacitors of large leakage current, or high DC resistance and inductance are undesirable, the effects are nowhere near as serious as the insertion of a capacitor in the signal path.

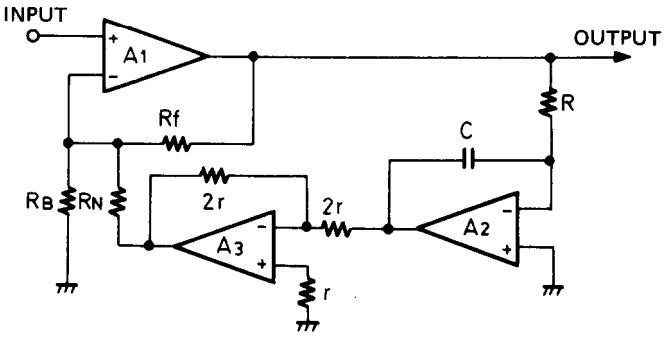


Fig 1.3

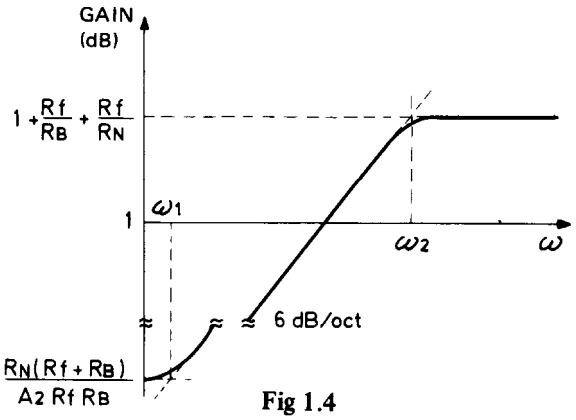


Fig 1.4

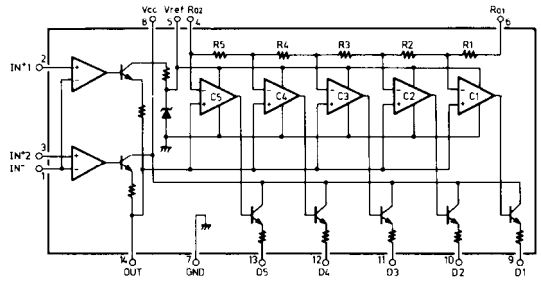
2. OUTPUT INDICATOR DRIVER CIRCUIT

Q701 (Q702) and Q703 (Q704) are the power indicator driver ICs. The audio signal applied to pin no.3 of Q701 is first amplified and then applied to the comparator. The LEDs connected to the IC output terminals pin nos.9 ~ 13 are lit up in succession depending on the comparator level. With the inclusion of a second IC, Q703, in the A-7070 the number of power indicator LEDs has been increased to 8.

The Q701 amplifier output, pin no.14, is connected to pin no.14 of Q703, while pin no.6 of Q701 is connected to pin no.4 of Q703, thereby using the comparator divider resistance in a cascade connection. The amplifier circuit in Q703 is not required, so pin no.1 is left open, and pin nos.2 and 3 are connected to ground. The corresponding LEDs will thus light up in succession from D705, D707, and D709, again depending on the comparator level.

The connection from pin no.14 to pin no.1 in Q701 is part of a feedback loop where the feedback resistor R725 (22kΩ) determines the gain of the amplifier, and is consequently used in the adjustment of indicator level.

Pin no.2 of Q701 is connected to the protector circuit. So when the protector circuit is activated as a result of some abnormality in the amplifier circuitry, and for the first 4 seconds (approx.) after the power is switched on, the speaker relay is activated. All of the indicator LEDs light up in unison, and the audio output signal is muted.



LB1416 EQUIVALENT DIAGRAM

COMPONENT LOCATION – PARTS LIST

120V model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	12659521	NAEQ-621, Equalizer ampli. p.c.b.
2	U2	12659522	NASW-622, Switch p.c.b.
3	U3	12659523	NASW-623, Switch p.c.b.
4	U4	12659524	NAVR-624, Volume control p.c.b.
5	U5	12659525	NAAF-625, Preampli., power ampli., rectifier and protection circuit p.c.b.
6	U6	12659526	NASW-626, Switch p.c.b.
7	U7	12659527	NAME-627, Output indicator driver p.c.b.
8	U8	12659529	NADIS-629, Output indicator p.c.b.
9	U9	12659530	NAPS-630, Rectifier p.c.b.
10	Q505,Q605	2211256	2SC1815(BL),
		2211255 or	2SC1815 (GR) or Thermo ampli.
		2210746	2SC945A(P) transistor
11	Q508,Q608	2201012	2SD745(R) or Power ampli.
		2201013 or	2SD745(Q) transistor
12	Q509,Q609	2201022	2SB705(R) or Power ampli.
		2201023 or	2SB705(Q) transistor
13	PL001	210057	PL6.3V, 0.15A, Power indicator lamp
14	T001	230279	NPT-666D, Power transformer
15	C001	3504012	UL125V, 103M, UL capacitor
16	R001,R002	441723314	330Ω, 2W, Metal oxide film resistor
17	S001	25035135	NPS-111-L100P
		25035138 or	NPS-111-L103P or Power switch
18	S002	25030124	NRSM-244-35Y, Speaker selector switch
19	P001	25045018	LJ-100-H, Stereo headphone jack
20	P002	25060008	Ground terminal
21	P003,P004	25060029	NTM-4PRMN05, Speaker terminal
22	P005-P007	25050032	S-I6444-01, AC outlet
23	W001	253099	AS-UC-3, Power supply cord
24	W001a	270025	SR-3P-4, Strainrelief
25	F001	252050	5A, ST-6, AC fuse
26	F001a	250080	S-N1301, Fuseholder
27	S003	25030125	NRSM-104-35ZV, Operation block of selector switch
28	S003a	25065083	Wire block of selector switch
29	S004	25030126	NRSM-105-35ZV, Operation block of tape monitor switch
30	S004a	25065084	Wire of tape monitor switch
32	A001	27110078	Front bracket
34	A003	27190043A	Holder
35	A004	28130074	Plate, output indicator
36	A014	27115043A	Side bracket
37	A015	27140267	Bracket for pc board
38	A016	27160051	Radiator
40	A018	27130148	Bracket for power transformer
41	A019	27140268	Bracket
42	A031	27120155	Back panel
43	A032	27150096A	Shielded palte for equalizer ampli.

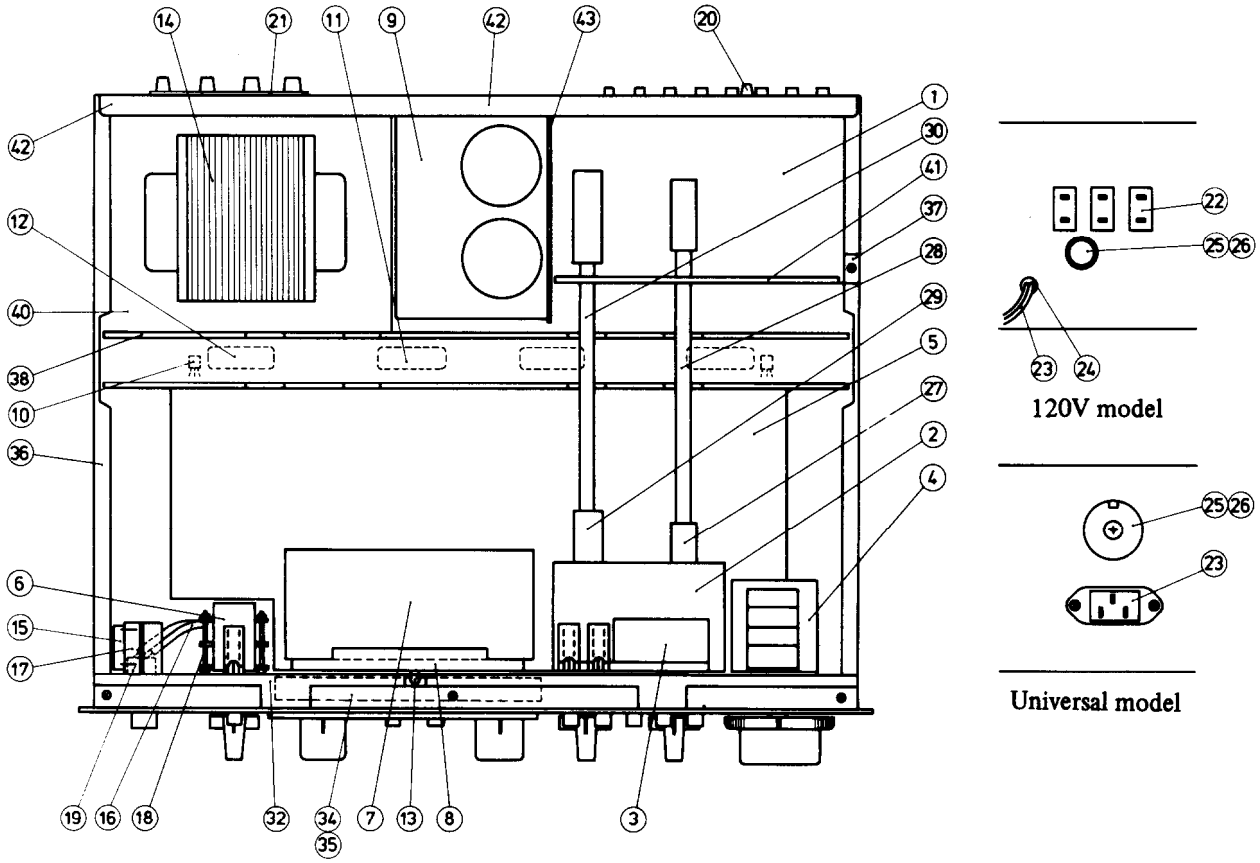
Universal model

REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U1	12660521A	NAEQ-621a, Equalizer ampli. p.c.b.
2	U2	12659522	NASW-622, Switch p.c.b.
3	U3	12659523	NASW-623, Switch p.c.b.
4	U4	12659524	NAVR-624, Volume control p.c.b.
5	U5	12659525	NAAF-625, Preampli., power ampli., rectifier and protection circuit p.c.b.
6	U6	12659526	NASW-626, Switch p.c.b.
7	U7	12659527	NAME-627, Output indicator driver p.c.b.
8	U8	12659529	MADIS-629, Output indicator p.c.b.
9	U9	12656530	NAPS-630, Rectifier p.c.b.
10	Q505,Q605	2211256	2SC1815(BL),
		2211255 or	2SC1815(GR) or Thermo ampli.
		2210746	2SC945A(P) transistor
11	Q508,Q608	2201012	2SD745(R) or Power ampli.
		2201013 or	2SD745(Q) transistor
12	Q509,Q609	2201022 or	2SB705(R) or Power ampli.
		2201023	2SB705(Q) transistor
13	PL001	210057	PL6.3V, 0.15A, Power indicator lamp
14	T001	230280	NPT-666ADGQ, Power transformer
15	C001,C002	3500052	PME271Y510CEE, IS capacitor
16	R001,R002	441723314	330Ω, 2W, Metal oxide film resistor
17	S001	25035051	NPS-121-L16P,Power switch
18	S002	25030124	NRSM-244-35Y, Speaker selector switch
19	P001	25045018	LJ-100-H, Stereo headphone jack
20	P002	25060008	Ground terminal
21	P003,P004	25060029	NTM-4PRMN05, Speaker terminal
23		25050018	PA-125, 3P Inlet
25	F001	252003	3A-T, AC fuse (220/240V model)
		252050	5A, ST-6 AC fuse (110/120V model)
26	F001a	25050021	X-I7240, Voltage selector sokcet
27	S003	25030125	NRSM-104-35ZV, Operation block of selector switch
28	S003a	25065083	Wire block of selector switch
29	S004	25030126	NRSM-105-35ZV, Operation block of tape monitor switch
30	S004a	25065084	Wire of tape monitor switch
32	A001	27110078	Front bracket
34	A003	27190043A	Holder
35	A004	28130074	Plate, output indicator
36	A014	27115043A	Side bracket
37	A015	27140267	Bracket for pc board
38	A016	27160051	Radiator
39	A017	223012	RH-14, Bracket
40	A018	27130148	Bracket for power transformer
41	A019	27140268	Bracket
42	A031	27120156	Back panel
43	A032	27150096A	Shielded plate for equalizer ampli.

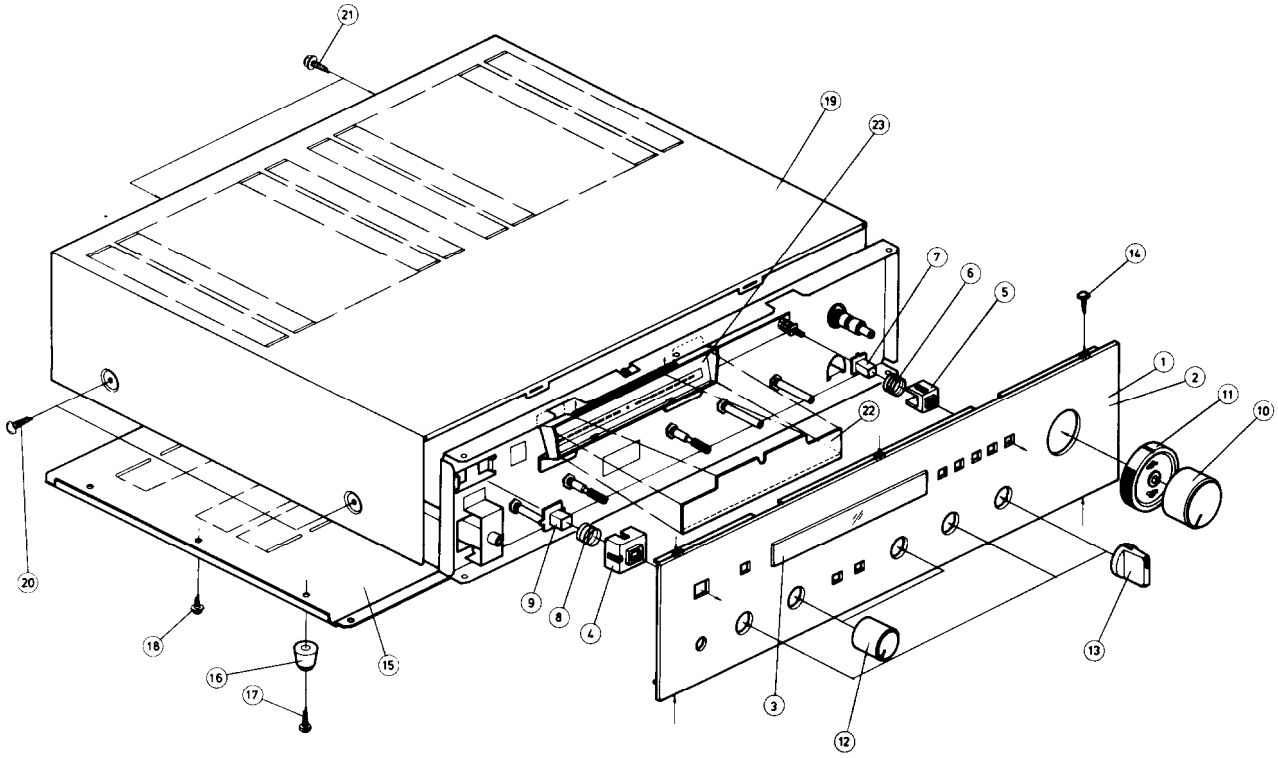
EXPLODED VIEW – PARTS LIST

REF. NO.	PARTS NO.	DESCRIPTION
1	12659121	Front panel ass'y (2, 3)
2	27210121	Front panel
3	28191037	Glass, output indicator
4	27267048A	Guide, power switch
5	27267049A	Guide, push switch (Push switch button ass'y (5, 6, 7) (P.N 1369125)
6	27180037	Spring, push switch
7	28320318	Push switch button
8	28180038	Spring, power switch
9	28320319	Power switch button
		Power switch ass'y (7, 8, 9) (P.N 1369126)
10	28320310	Volume control knob
11	28320311	Balance control knob
12	28320312	Tone control knob
13	28320314	Selector switch knob
14	834130062	3STS+6BQ, Tapping screw
15	27170054	Bottom board
16	27175009	Leg
17	831130162	3STW+16BQ, Tapping screw
18	831130082	3STW+8BQ, Tapping screw
19	28184051	Top cover
	28140020	4t x 10 x 40mm, Cushion
20	838440109	4TTB+10C(BC), Tap screw
21	834430062	3STS+6BQ(BC), Tapping screw
22	28130074	Plate, output indicator
23	27190043A	Holder

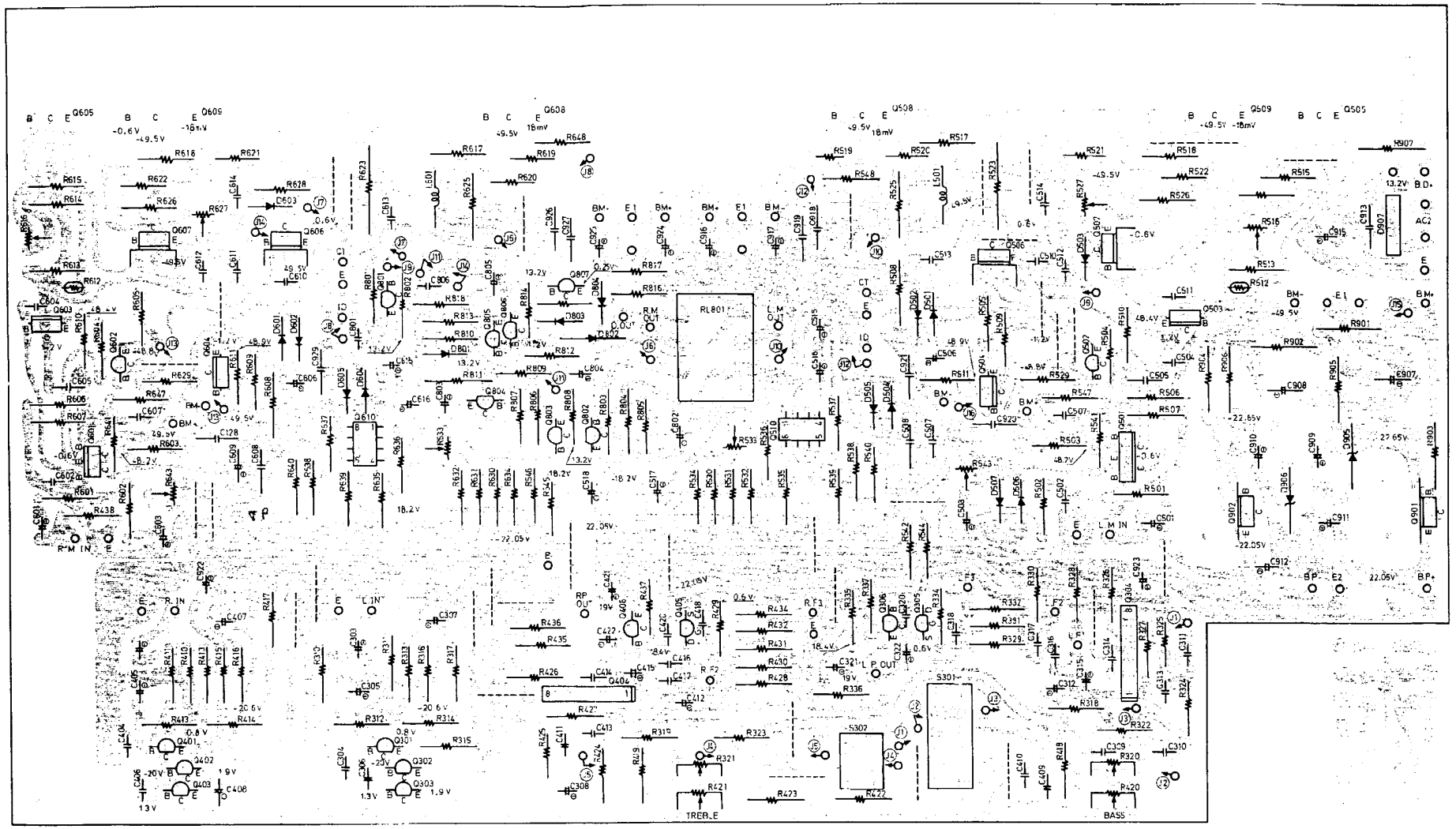
COMPONENT LOCATION



EXPLODED VIEW



PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE



POWER AMPLIFIER ADJUSTMENT

1. Set the all control knobs to standard position.

Standard knob position

SELECTOR	AUX
TAPE MONITOR	SOURCE
VOLUME	MAXIMUM
BALANCE, BASS/TREBLE	CENTER
MODE	STEREO
MUTING, LOUDNESS, LOW FIL./HI-FIL	OFF
BASS/TREBLE SHIFT	DEFEAT
SPEAKER	A

1. IDLING CURRENT ADJUSTMENT

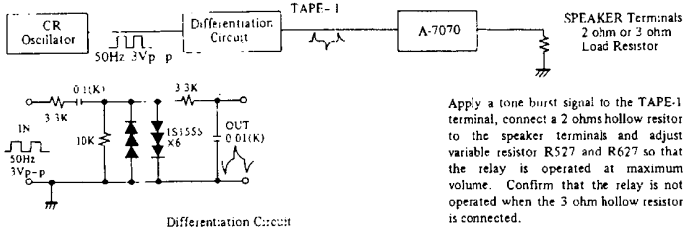
1. Connect the DC voltmeter between I_{ID} and V_{CT} terminals.
2. Adjust the voltage to 19±2mV with semi-fixed resistor of R516 and R616

NOTES: Adjust after switching on for 5 minutes.
VOLUME ..... Minimum, Open load.

2. SERVO OPERATIONAL AMPLIFIER ADJUSTMENT

1. Place the short circuit across TP terminals of servo operational circuit.
2. Connect the DC voltmeter between V_{CT} and E terminals and confirm the voltage within 0±0.7mV
3. Remove the short circuit
4. Adjust the voltage to 0±1mV with semi-fixed resistor of 533 and R633

3. CURRENT DETECTOR LEVEL ADJUSTMENT



Differentiation Circuit

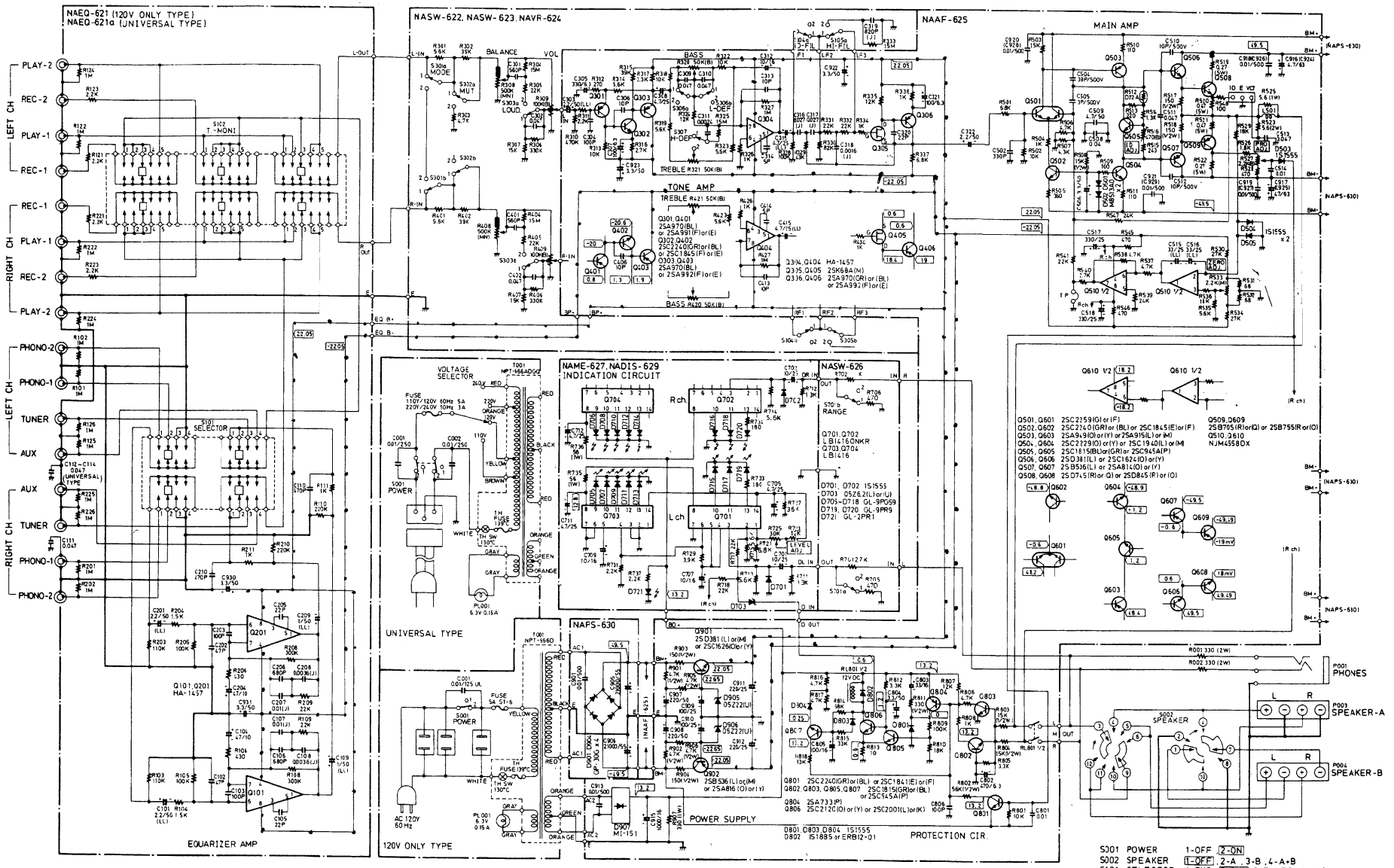
Apply a tone burst signal to the TAPE-1 terminal, connect a 2 ohms hollow resitor to the speaker terminals and adjust variable resistor R527 and R627 so that the relay is operated at maximum volume. Confirm that the relay is not operated when the 3 ohm hollow resistor is connected.

NOTES: Adjust after switching on for 5 minutes.
VOLUME ..... Maximum

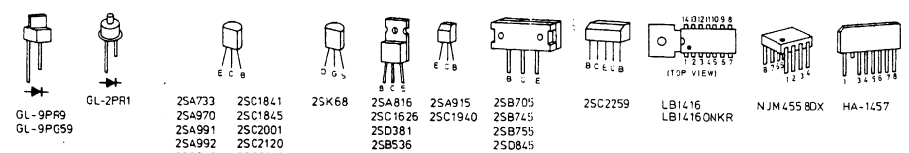
4. OUTPUT INDICATOR LEVEL ADJUSTMENT

1. Connect the AF oscillator across AUX termianl and AC voltmeter across speaker terminals.
2. Connect the hollow resistor of 8 ohms across speaker terminal (A).
3. Set the AF oscillator output to 100mV.
4. Adjust the output voltage to 23.7V with volume control.
5. Then adjust the semi-fixed resistor of R725 and R726 to light up 7th L.E.D.

SCHEMATIC DIAGRAM
Model A-7070



NOTES:
- ALL RESISTORS ARE IN OHMS, ¼WATT UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN µF, 50WV UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (—⊕—) ARE IN µF/WV.
- VOLTAGE ARE MEASURED WITH DC-VOLTMETER V.T.V.M. (NO SIGNAL INPUT)
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.



S001	POWER	1-OFF, [2-ON]
S002	SPEAKER	[1-OFF], 2-A, 3-B, 4-A+B
S101	SELECTOR	1-PH2, [2-PH1], 3-TUNER, 4-AUX
S102	T-MONI	1-(1▸2), 2-TAPE1, [3-SOURCE], 4-TAPE 2, 5-(2▸1)
S301	MODE	[1-STEREO], 2-MONO
S302	MUTING	[1-0dB], 2--20 dB
S303	LOUDNESS	[1-OFF], 2-ON
S304	LO-FIL	[1-OFF], 2-ON
S305	HI-FIL	[1-OFF], 2-ON
S306	LO-DEF	[1-DEFEAT], 2-400Hz
S307	HI-DEF	[1-DEFEAT], 2-2KHz
S701	RANGE	[1-(X1)], 2-(X 0.1)

ONKYO CORPORATION

PRINTED CIRCUIT BOARD – PARTS LIST

EQUALIZER AMPLIFIER PC BOARD (NAEQ-621) – PARTS LIST
120V model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	ICs	
Q101, Q201	222471	HA-1457
	Capacitors	
C101, C201	392880227	2.2μF, 50V, LL
C104, C204	352734701	47μF, 10V, Elect.
C109, C209	392880107	1μF, 50V, LL
C930, C931	352780331	3.3μF, 50V, Elect.
	Terminals	
P101, P102	25045041	NPJ-6PDBL18
P103	25045020	NPJ-4PDBL11
	Switches	
S101	25065081	NSS-4445, Selector
S102	25065082	NSS-6646, Tape monitor

EQUALIZER AMPLIFIER PC BOARD (NAEQ-621a) – PARTS LIST
Universal model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	ICs	
Q101, Q201	222471	HA-1457
	Capacitors	
C101, C201	392880227	2.2μF, 50V, LL
C104, C204	352734701	47μF, 10V, Elect.
C109, C209	392880107	1μF, 50V, LL
C930, C931	352780331	3.3μF, 50V, Elect.
	Terminals	
P101, P102	25045041	NPJ-6PDBL18
P103	25045020	NPJ-4PDBL11
	Switches	
S101	25065081	NSS-4445, Selector
S102	25065082	NSS-6646, Tape monitor

SWITCH PC BOARD (NASW-622) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Capacitors	
C319, C419	372328214	820pF±5%, 50V, ST
	Switches	
S301–S305	25035111	NPS-522-L76, Low-cut/High-cut/ Mode/Loudness/Muting

VOLUME CONTROL PC BOARD (NAVR-624) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R308, R408 R309, R409	5104078	N24RDQ41C500KMN100KBTP35H, Volume/Balance control variable resistor

PREAMPLI., POWER AMPLI., AND PROTECTION CIRCUIT PC BOARD (NAAF-625) – PARTS LIST

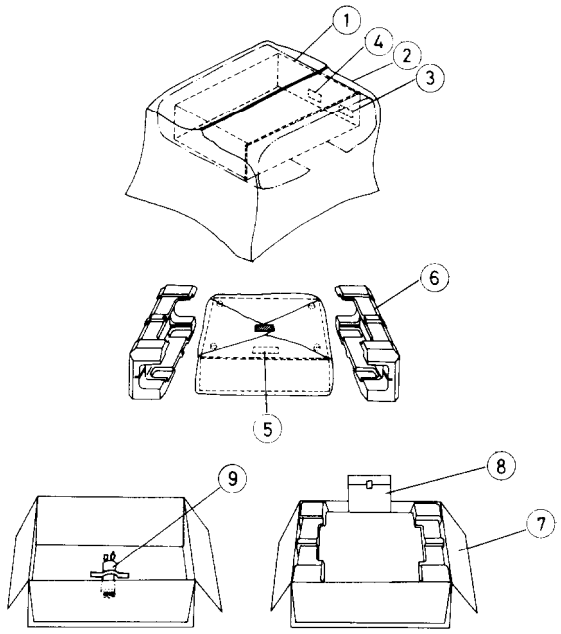
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	ICs	
Q304, Q404	222471	HA-1457
Q510, Q610	222502	NJM4558DX
	Transistors	
Q301, Q401	2211782 or 2211783	2SA991(F) or 2SA991(E)
Q302, Q402	2211732 or 2211733	2SC1845(F) or 2SC1845(E)
Q303, Q403	2211792 or 2211793	2SA992(F) or 2SA992(E)
Q305, Q405	2211303	2SK68(A) (M)
Q306, Q406	2211792 or 2211793	2SA992(F) or 2SA992(E)
Q501, Q601	2211372 or 2211371	2SC2259(G) or 2SC2259(F)
Q502, Q602	2211732 or 2211733	2SC1845(F) or 2SC1845(E)
Q503, Q603	2211742 or 2211743	2SA915(L) or 2SA915(M)
Q504, Q604	2211762 or 2211763	2SC1940(L) or 2SC1940(M)
Q505, Q605	2211256,– 2211255 or 2210746	2SC1815(BL), 2SC1815(GR) or 2SC945A(P)
Q506, Q606	2201042	2SD381(L)
Q507, Q607	2201052	2SB536(L)
Q508, Q608	2201012 or 2201013	2SD745(R) or 2SD745(Q)
Q509, Q609	2201022 or 2201023	2SB705(R) or 2SB705(Q)
Q801	2211405, 2211406, 2211802 or 2211803	2SC2240(GR), 2SC2240(BL), 2SC1841(F) or 2SC1841(E)
Q802, Q803	2211255, 2211256 or 2210746	2SC1815(GR), 2SC1815(BL) or 2SC945(A)P
Q804	2210803	2SA733(P)
Q805	2211255, 2211256 or 2210746	2SC1815(GR), 2SC1815(BL) or 2SC945(A)P
Q806	2211163, 2211164, 2211772 or 2211771	2SC2120(O), 2SC2120(Y), 2SC2001(L) or 2SC2001(K)
Q807	2211225, 2211256 or 2210746	2SC1815(GR), 2SC1915(BL) or 2SC945(A)P
Q901	2200663, 2200664, 2201042 or 2201043	2SC1626(O), 2SC1626(Y), 2SD381(L) or 2SD381(M)
Q902	2200673, 2200674, 2201052 or 2201053	2SA816(O), 2SA816(Y), 2SB536(L) or 2SB536(M)
	Diodes	
D501,D502, D601, D602	4000031	M8513A(O)
D503–D505 D603–D605	223105	1S1555
D801, D803 D804	223105	1S1555
D802	223802 or 223849	1S1885 or ERB12-01
D905	224069	05Z22U
D906	224069	05Z22U
D907	223853	MI-151
	Coils	
S501, S601	231001	S-1.3B
	Capacitors	
C303, C403	392880227	2.2μF, 50V, LL
C305, C405	352723311	330μF, 6.3V, Elect.
C307, C407	352721011	100μF, 6.3V Elect.
C308, C408	352750471	4.7μF, 25V, Elect.
C312, C412	352741001	10μF, 16V, Elect.
C315, C415	392850477	4.7μF , 25V, LL
C321, C421	352721011	100μF, 6.3V, Elect.
C322, C422	352780221	2.2μF, 50V, Elect.
C506, C606	352780331	3.3μF, 50V, Elect.
C509, C609	352780471	4.7μF, 50V, Elect.
C513, C613	374124735	0.047μF±10%, 50V, DE
C515, C516	392853307	33μF, 25V, LL
C615, C616	392853307	33μF, 25V, LL
C517, C518	352753311	330μF, 25V, Elect.
C802	352724711	470μF, 6.3V, Elect.
C803	352743301	33μF, 16V, Elect.
C804	352780331	3.3F, 50V, Elect.
C805	352741011	100μF, 16V, Elect.
C907	352782211	220μF, 50V, Elect.
C908	352782211	220μF, 50V, Elect.
C909, C910	352751011	100μF, 25V, Elect.
C911, C912	352752211	220μF, 25V, Elect.
C915	352741021	1,000μF, 16V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
C916, C917	352770471	4.7μF, 63V, Elect.
C922, C923	352780331	3.3μF, 50V, Elect.
C924, C925	352770471	4.7μF, 6.3V, Elect.
	Resistors	
R320, R420	5148033	N16RGM11C50KB35, Bass control variable
R321, R421	5148033	N16RGM11C50KB35, Treble control variable
R512, R612	4000003	D22A, Themistor
R516, R616	5225026	N10HR470BD, Semi-fixed
R517, R617	441521514	150Ω, 1/2W, M.O.F.
R518, R618	441521514	150Ω, 1/2W, M.O.F.
R519, R619	4000049	0.27Ω, 5W, Metal plate
R520, R620	4000047	0.47Ω, 5W, Metal plate
R521, R621	4000047	0.47Ω, 5W, Metal plate
R522, R622	4000049	0.27Ω, 5W, Metal plate
R523, R624	451730564	5.6Ω, 2W, Metal
R525, R625	451630564	5.6Ω, 1W, Metal
R527, R627	5225005	N10HR2.2KBD, Semi-fixed
R533, R633	5225070	N10HR2.2KBDM, Semi-fixed
R903, R904	441521514	150Ω, 1/2W, M.O.F.
R907	441623314	330Ω, 1W, M.O.F.
	Radiators	
	27160029	RAD-07
	27160011	RAD-05
	Relay	
RL801	25065085A	NRL-2P5A-DC12-03
	Switches	
S301, S302	25035110	NPS-122-142-L75, Tone defeat

SWITCH PC BOARD (NASW-626) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
S701	25035109	NPS-122-L74, Output level indicator attenuator

PACKING PROCEDURES



OUTPUT INDICATOR DRIVER PC BOARD (NAME-627) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q701–Q702	222564	LB-1416ONK(R), Power indicator driver IC
Q703, Q704	222539	LB-1416, Power indicator driver IC
D701, D702	223105	1S1555, Diode
D703	224042 or 224043	05Z6.2L or 05Z6.2U, Diode
C701, C702	352751001	10μF, 25V, Elect. capacitor
C705–C706	352750471	4.7μF, 25V, Elect.
C707–C710	352741001	10μF, 16V, Elect.
C711, C712	352750471	4.7μF, 25V, Elect.
R725, R726	5225089	N10HR30KBC, Semi-fixed resistor
R735, R736	441625604	56Ω, 1W, M.O.F. resistor

OUTPUT INDICATOR PC BOARD (NADIS-629) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D705–D718	225028	GL-9PG59, L.E.D
D719, D720	225029	GL-9PR9, L.E.D
D721	225018	GL-2PR1, L.E.D

RECTIFIER PC BOARD (NAPS-630) – PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
D901–D904	223841	GP-30G, Diode
C905, C906	3504117	21,000μF, 55V, Elect. capacitor

NOTES:
1. Capacitors
   - LL: Low leakage current type electrolytic capacitor
   - DE: Non-inductive polyester film capacitor
   - ST: Polystren film capacitor
2. Resistors
   - MOF: Metal oxide film resistor

REF. NO.	PARTS NO.	DESCRIPTION
1	29100036	850 x 550mm, Poly bag
2	29095012	500 x 800mm, Protection sheet
3	29380040	Cabinet composite label (USA)
4	282969	Caution label (A) (USA)
5	293041	Caution label (USA)
6	29090398	Pad
7	29050268	Carton box
8		Accessary bag complete
	U.S.A. model	
	29340313	Instruction manual
	29365006	Warranty card
	29358002	S. S list
	29100006	250 x 350mm, Poly bag
	Universal model	
	29340314	Instruction manual
	25055018	Conversion plug
	252020	5A-7T, Fuse
	29100002	150 x 80 mm Poly bag for fuse
	29100006	250 x 350mm, Poly bag
	Germany model	
	29340314	Instruction manual
	29365005-1	Warranty card
	29100006	250 x 350mm, Poly bag
9		Power supply cord (UU)
	253089	AS-VDE-C, Power supply cord (G)
	29380038	Voltage tag

NOTE: (USA): U.S.A. model
(UU): Universal model
(G): Germany model

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I903 Printed in Japan